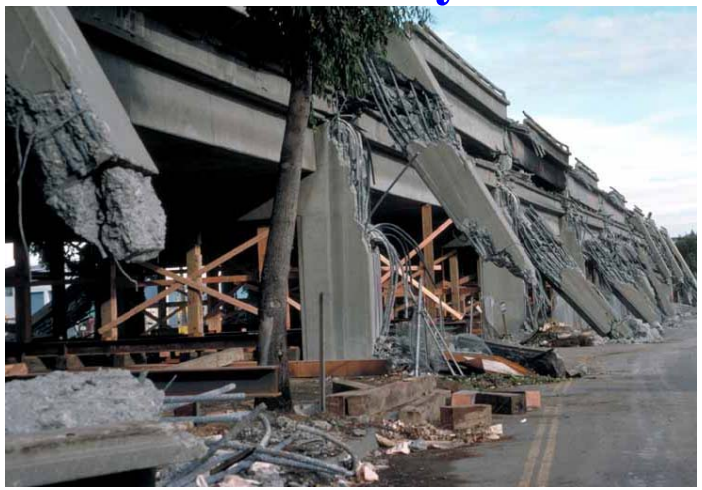
UB-EERI Student Chapter Annual Meeting

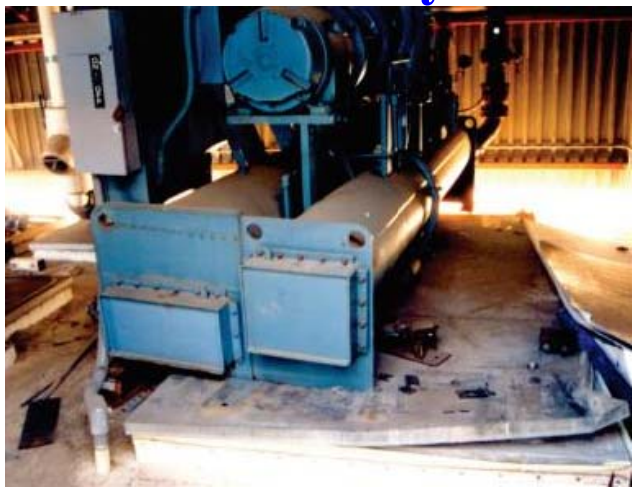
Date: 10-02-2015 Time: 12:30 PM Venue: 140 Ketter Hall

Earthquake Risk: Failure

Structural System

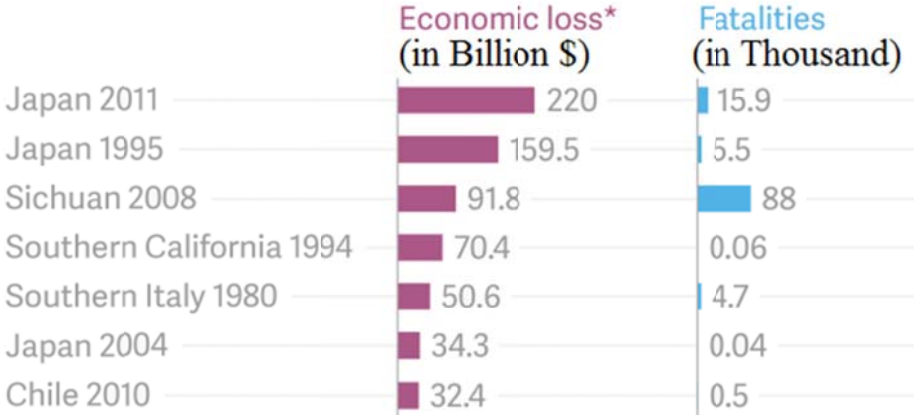


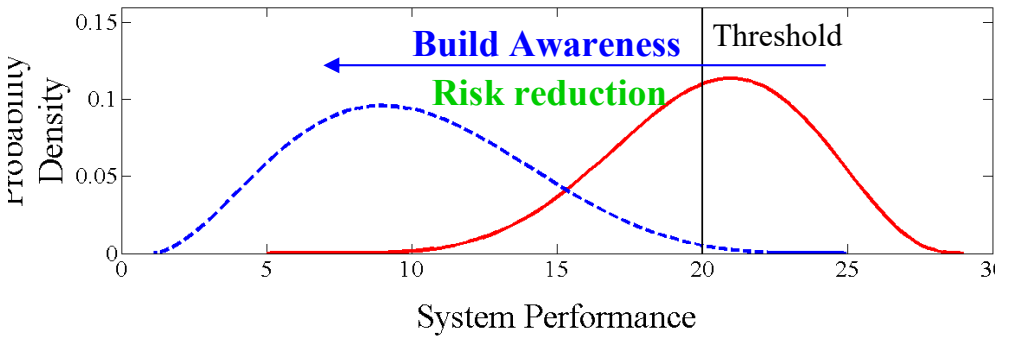
Mechanical System



Electrical System

Socio-Economic Impact





Please join us to build a safe and sustainable world

Student Chapter
University at Buffalo

DEPARTMENT OF CIVIL, STRUCTURAL AND ENVIRONMENTAL ENGINEERING

University at Buffalo
The State University of New York

CSEE GRADUATE STUDENT ASSOCIATION

ENGINEERING SEMINAR

Seismic Rehabilitation of Sub-standard Steel Concentrically Braced Frame Buildings Using Stiff Elastic Cores

Abstract: Seismic design of multi-story buildings requires capacity design principles that allow for distributed damage through plastic member deformations over the building height while preventing concentrated, soft-story failure mechanisms that may lead to building collapse. Evaluation of braced frame buildings designed to modern and historic seismic design codes has revealed that such buildings may not meet desirable performance objectives or may collapse during either design-basis or maximum considered earthquake hazards. Poor performance in modernly designed braced frame buildings appears likely due to improper consideration of the brace strength degradation while older buildings fail due to undesirable, non-ductile failure modes of members or connections. This research investigates a rehabilitation approach for existing buildings that uses a stiff (elastic) rocking core (SRC) to redistribute plastic deformations along the frame's height which can also provide supplemental strength and stiffness to the existing frame by including steel yielding links. The rehabilitation approach is intended to be non-intrusive for buildings in-service while also attempting to limit the structural forces to existing members and the foundation. An improved design procedure for braced frame columns is also proposed for design of new CBF buildings. Various frame designs representing modernly designed, older non-ductile, rehabilitated, 3-story, and 6-story frames were evaluated using nonlinear transient seismic analysis and large-scale hybrid experimental testing. Predictive, analytical, and experimental response results show reasonable agreement, and the proposed rehabilitative technique is believed to be cost-effective and reliable for preventing soft-story collapse and achieving desirable performance levels in low-to-mid-rise steel braced frame structures.

Michael Pollino, Ph.D., S.E., P.E.
Assistant Professor, Dept. of Civil Engineering, Case Western Reserve University

Michael Pollino is currently an assistant professor in the Dept. of Civil Engineering at Case Western Reserve University (CWRU) in Cleveland, Ohio. His research seeks to develop structural members, connections, and systems for enhanced resiliency and sustainability under various hazards including earthquakes. Other ongoing research projects include seismic isolation and passive control of steel storage racks and structural monitoring of wind turbines. He was awarded the AISC Milek Fellowship in 2014 to support his research related to multi-hazard design of steel buildings and is a member of the ASCE Seismic Effects and Multi-Hazard Mitigation technical committees. He teaches courses in structural analysis and design, civil engineering materials, and dynamics and has been awarded a teaching fellowship and instructional support grant by CWRU to support his teaching methods which include active learning and experiential activities.

Date: March 4, 2016
Time: 12:00 Noon

Location: 140 Ketter Hall, North Campus, University at Buffalo

Refreshments will be served!

EERI Student Chapter University at Buffalo

ENGINEERING WORKSHOP

Workshop on Performing Nonlinear Dynamic Analysis in SAP2000

The SAP2000 software program by Computers and Structures, Inc. (CSI) is an efficient tool for analyzing structures subject to static and dynamic loads. A friendly graphical user-interface and options to include parameters directly from engineering codes and guidelines makes it a widely accepted tool.

This workshop will provide a hands-on experience on using SAP2000 for estimating response of structures subject to dynamic loads. A simple steel moment-frame structure will be used to demonstrate steps involved in performing modal, pushover, response-spectrum, and response time-history analyses. Different options available in SAP2000 to capture nonlinear behavior of structure and their effects on structural response will also be discussed.

Manish Kumar, Ph.D., P.E.
Post-doctoral Associate, University at Buffalo, USA

Manish Kumar is a post-doctoral researcher at University at Buffalo. His research interest lies in the theoretical and experimental work to address issues related to analysis and design of structures subject to seismic, blast and impact loads. He received Bachelor's degree in Civil Engineering from IIT Kanpur and his Master's and Ph.D. degrees from University at Buffalo. His Ph.D. research focused on investigation of the feasibility of seismic isolation technology to nuclear power plants (NPPs). As a post-doctoral researcher, he is investigating the effect of aircraft-impact on base-isolated NPPs. He is also licensed as a Civil Engineer (P.E.) in the state of California. He has developed several open-source modules in software programs like OpenSees, ABAQUS and LS-DYNA. He has previously conducted hands-on workshops on using software programs like OpenSees, Air3D and LS-DYNA.

Date: March 11, 2016
Time: 10:30 AM

Location: 208 Ketter Hall, North Campus, University at Buffalo

Seats are limited to 30 and available on first come first serve basis.
Please register by sending an email to kundango@buffalo.edu with (1) Title: "SAP2000 Workshop" and (2) Your Full Name

You can check for upcoming events here: http://gsa.buffalo.edu/eeri/activities/

Student Chapter
University at Buffalo

ENGINEERING SEMINAR

Cities, Earthquakes, and Time

Abstract: Earthquakes occur suddenly, in a brief instant of time. But their effects ─ and the actions we take to reduce their effects ─ stretch over many years. In this talk, I explore some of the characteristics of the relationship between earthquakes and time. More importantly, I explain how these various time characteristics affect policy decisions. I draw four policy conclusions from this rumination on time, relating to: mitigation, speed and quality of recovery, planning for resilience, and construction standards.

Robert Olshansky, Ph.D., FAICP
Professor and Head, Dept. of Urban and Regional Planning
University of Illinois at Urbana-Champaign

Robert Olshansky's (M. EERI, 1987) research and 25 years of teaching cover land use and environmental planning, with an emphasis on planning for natural hazards. He has extensively studied recovery planning and management after several major disasters across various countries including China, India, Japan, Indonesia and Haiti. His expertise in disaster management and planning has been honored by naming him as the EERI Distinguished Speaker for 2015. The EERI Distinguished Lecture Award is given to members of the Institute to recognize and encourage communication of outstanding professional contributions of major importance for earthquake hazard mitigation.

Date: March 25, 2016
Time: 10:30 AM

Location: 140 Ketter Hall, North Campus, University at Buffalo

Refreshments will be served!

You can check for upcoming events here: http://gsa.buffalo.edu/eeri/activities/

Student Chapter
University at Buffalo

VOLUNTARY TRIP

Habitat for Humanity Buffalo

Habitat for Humanity Buffalo is a non-profit charitable organization seeking to alleviate the shortage of quality affordable housing in Buffalo, New York. Through volunteer labor and tax-deductible donations of money, land, and materials, the organization builds or rehabilitates simple, decent houses.

Founded in 1985, Habitat for Humanity Buffalo built its 100th house in 2002 and 200th house in 2009. The organization has provided home ownership for 999 people including 651 children. Families are selected based on their level of need, willingness to work, acceptance of responsibilities and ability to repay mortgage. To volunteer for Habitat for Humanity Buffalo or to obtain more information please visit ***www.habitatbuffalo.org***.

Date: April 02, 2016 **Location: 65 Sirret St, Buffalo, NY 14220**
Time: 08:45 AM **Conveyance: Carpool (8 AM from UB South)**

Seats are limited to 4 and available on first come first serve basis.

Please register by sending an email to kundango@buffalo.edu with
(1) Title: "Habitat for Humanity Trip" ***and*** **(2) Your Full Name**

You can check for upcoming events here: http://gsa.buffalo.edu/eeri/activities/

Student Chapter
University at Buffalo

TECHNICAL SESSION AND SOCIAL HOUR

Annual Journal Discussion Session and Dinner Party

Date: April 23, 2016 **Time:** 06:30 PM

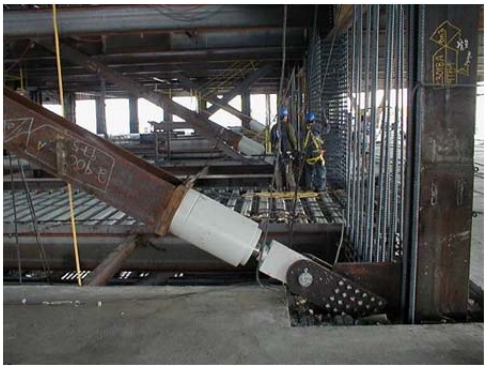
Location: Hadley Village Community Center, UB North Campus

You can check for upcoming events here: http://gsa.buffalo.edu/eeri/activities/

Student Chapter
University at Buffalo

TECHNICAL TRIP

Taylor Devices Inc.



Taylor Devices Inc. is a globally reputed company in the area of shock and vibration control (http://www.taylordevices.com). The trip to Taylor Devices will provide an opportunity to see the manufacturing and testing processes of full scale shock absorbers and passive dampers.

Date: April 25, 2016 **Time: 02:30 PM**
Location: 90 Taylor Drive, North Tonawanda, NY 14120
Conveyance: Carpool (from Ketter Lot, UB North Campus)

You can check for upcoming events here: http://gsa.buffalo.edu/eeri/activities/

Student Chapter
University at Buffalo

ENGINEERING SEMINAR

Findings of a Reconnaissance Trip Following the 2015 Nepal Earthquake

Abstract: The M7.8 Ghorka Earthquake struck Nepal on April 25, 2015. This earthquake and its aftershocks had a significant impact on the urban and rural areas in the country causing more than 9,000 human losses, as well as widespread ground failure that prevented speedy recovery in many affected regions. The seismic sequence also caused extensive structural damage to the building stock that consists of low- to mid-rise reinforced concrete and masonry structures.

This presentation will discuss the findings of a reconnaissance team that visited Nepal shortly after the main shock in June 2015. The UB team collaborated with researchers from universities in the US and Europe, as well Nepalese researchers to document damage and collect perishable architectural and structural data. Data were obtained through traditional methods as well as 3D ground-based LiDAR scans. Moreover, ambient vibration recordings from selected damaged structures were obtained and are used in developing and validating numerical models and damage assessment algorithms which will be discussed.

Speaker Bio: Andreas Stavridis is an Assistant Professor in the Department of Civil, Structural and Environmental Engineering at the University at Buffalo. He obtained his Diploma in Civil Engineering in 2002 from the National Technical University of Athens. He earned his MSc and PhD in Structural Engineering in 2004 and 2009 from the University of California, San Diego. His current research focuses on assessing and improving the seismic performance of existing concrete and masonry structures as well as improving the design guidelines for new construction using computational simulations as well as large-scale quasi-static and dynamic tests. He is a member of EERI, ASCE, ACI, and The Masonry Society, and a member of the ACI 369 and the ASCE 41 masonry committee.

Date: May 03, 2016
Time: 11:00 AM

Location: 140 Ketter Hall, North Campus, University at Buffalo

Article Title	A Framework for Linking Community-Resilience Goals to Specific Performance Targets for the Built Environment
Authors	Michael Mieler, Bozidar Stojadinovic, Robert Budnitz, Mary Comerio, and Stephen Mahin
Volume No.	31
Issue No.	3
Journal	Earthquake Spectra
Pages	1267–1283
Reviewed By	Shoma Kitayama
Designation	PhD Student in the Department of Civil, Structural, and Environmental Engineering
Organization	University at Buffalo

Major Contributions:

(1) A conceptual framework that can be used to explicitly link community-level resilience goals to specific design targets for individual systems and components within the built environment was proposed.

(2) A consistent performance target for individual residential buildings from a community-level resilience goal was derived.

(3) Potential applications of the proposed framework, including a critical evaluation of current building codes to verify whether their target performance objectives are compatible with community-level resilience goals was presented.

Possible Future Directions:

(1) Further Recovery data collected in the aftermath of earthquakes and other disasters can be used both to calibrate and improve the presented framework.

(2) While the proof-of-concept example presented in this paper has focused on developing a performance target for individual residential buildings, the proposed methodology can be employed to establish performance targets for additional components and systems within the built environment, including hospitals, office buildings, schools, and lifeline systems like electricity, gas, water, and wastewater.

Article Title	Provisions for the Seismic Risk Evaluation of Existing Reinforced Concrete Buildings in Turkey under the Urban Renewal Law
Authors	Baris Binici, Ahmet Yakut, Guney Ozcebe, and Atila Erenlerc
Volume No.	31
Issue No.	3
Journal	Earthquake Spectra
Pages	1353–1370
Reviewed By	Shoma Kitayama
Designation	PhD Student in the Department of Civil, Structural, and Environmental Engineering
Organization	University at Buffalo

Major Contributions:

(1) Technical provisions for seismic risk assessment in Turkey are presented.

(2) A simple procedure to consider the beneficial presence of infill walls at low deformations is presented.

(3) Results of example application of seismic risk assessment are given for case study buildings.

Possible Future Directions:

(1) The number of buildings in Turkey to be examined in the next ten years is estimated to be on the order of 5 million, thus the process of this assessment would be reviewed later.

(2) The committee decided to employ linear elastic procedures for seismic assessment, thus the possible limitation of this assessment may be examined later.

Article Title	Experimental Shake Table Testing of an Adaptive Passive Negative Stiffness Device within a Highway Bridge Model
Authors	Navid Attary, Michael Symans, Satish Nagarajaiah, Andrei M. Reinhorn, Michael C. Constantinou, Apostolos A. Sarlis, Dharma T. R. Pasala, and Douglas P. Taylor
Volume No.	31
Issue No.	4
Journal	Earthquake Spectra
Pages	2163-2194
Reviewed By	Basit Qayyum
Designation	PhD Student in the Department of Civil, Structural, and Environmental Engineering
Organization	University at Buffalo

Major Contributions:

(1) The concept of negative stiffness was utilized in a bridge structure via the implementation of a negative stiffness device (NSD).

(2) The NSD was installed in a bridge structure and its performance under seismic loading was evaluated.

(3) The performance of NSD was compared with other types of seismic response modification devices (SRMDs) such as elastomeric bearings and fluid viscous dampers.

Possible Future Directions:

(1) The NSD has no practical implementation in structures, as of yet. A challenge is to scale the device for larger configurations along with other types of SRMDs.

(2) Since NSD is a new technology, it does not have any design and implementation methodology in seismic design codes.

Article Title	Quintuple Friction Pendulum Isolator-Behavior, Modeling and Validation
Authors	Donghun Lee and Michael C. Constantinou
Volume No.	-
Issue No.	-
Journal	Earthquake Spectra
doi	http://dx.doi.org/10.1193/040615EQS053M
Reviewed By	Reda Snaiki
Designation	PhD Student in the Department of Civil, Structural, and Environmental Engineering
Organization	University at Buffalo

Major Contributions:

(1) Behavior of the Quintuple Friction Pendulum isolator

(2) Analytical model for the Quintuple Friction Pendulum isolator in two general configurations of geometric and frictional properties

(3) Computational model that can be implemented in SAP2000

Possible Future Directions:

(1) Model validation under tri-axial shake table testing or multi-directional motion testing of individual isolators since the computational model is inherently tri-axial

(2) Comparison of the triple and Quintuple Friction Pendulum Isolator in terms of cost-benefit and performance for standard structures.

Article Title	Development of Collapse Indicators for Risk Assessment of Older-Type Reinforced Concrete Buildings
Authors	Panagiotis H. Galanis and Jack P. Moehle
Volume No.	31
Issue No.	4
Journal	Earthquake Spectra
Pages	1991-2006
Reviewed By	Alok Deshpande
Designation	Graduate Student in the Department of Civil, Structural and Environmental Engineering
Organization	University at Buffalo

Major Contributions:

(1) Characteristics correlating with high collapse risk are identified.

(2) Parameters considered – Column/Beam strength ratio, Column shear demand/capacity and number of stories

(3) The column/beam strength ratio is not high enough to push the beam mechanism up to all floors – it is concentrated in the lower quarter height for 1.2 (current ACI value).

(4) Taller frames are more likely to collapse because of P-delta effects and concentration of damage in the lower stories.

Possible Future Directions:

(1) Inclusion of irregular frames and torsion.

(2) Assess efficacy of the methodology by applying to existing buildings.

Article Title	A Beta Distribution Model for Characterizing Earthquake Damage State Distribution
Authors	David Lallemant and Anne Kiremidjian
Volume No.	31
Issue No.	3
Journal	Earthquake Spectra
Pages	1337–1352
Reviewed By	Kundan Goswami
Designation	PhD Student in the Department of Mechanical and Aerospace Engineering
Organization	University at Buffalo

Major Contributions:

(1) A comparison between Beta distribution and Binomial distribution (Braga model) for probabilistic characterization of earthquake damage states has been presented using damage data from the Haiti 2010 earthquake.

(2) The Beta distribution introduces less error in capturing the damage states, thereby emerging as a better model for earthquake damage probability distribution.

Possible Future Directions:

(1) Mathematical formulations can be developed that collectively map the various damage features of a building to a number on the real line between 0 and 1. This will eliminate the need of latent variable as well as the observed data will be distributed over [0,1] instead of certain discrete points.

(2) Family of probability distribution functions with more shape parameters can be introduced to capture the multi-modal damage distributions. A trade-off between the number of shape parameters and total number of parameters to be estimated can be achieved on the basis of performance of such distribution functions.

(3) Generalized extreme value distributions can be applied towards probabilistic characterization of building collapse rate. This can be compared against the Beta distribution for performance evaluation of these extreme value distributions.